

Topic: Plasmolysis
B.Sc. Botany (Sub.) II
Group: C
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Plasmolysis

If a plant cell is placed in a highly concentrated sugar or salt solution (i.e., hypertonic solution), water from the cell sap flows out due to exosmosis through the plasma membrane outside the cell. The loss of water from the cell sap causes contraction or shrinkage of the protoplasm. Since the cell wall is firm and less elastic, it cannot keep pace with the contraction of plasma membranes. Ultimately the protoplasm separates from the cell wall and assumes spherical shape. This condition is called plasmolysis.

The stage of plasmolysis at which the first sign of shrinkage of cell contents from cell wall becomes detectable is called 'incipient plasmolysis'. The stage when the cell wall has reached its limit of contraction and cytoplasm has detached from cell wall attaining spherical shape is called 'evident plasmolysis'. If a plasmolysis cell is placed in pure water or hypotonic solution, endosmosis takes place, the protoplasm as well as the cell as a whole attains its original shape and size respectively. The phenomenon is known as 'deplasmolysis'.

When a vacuolated parenchymatous plant cell is placed in a solution of sufficient strength, the protoplasm decreases in volume to such an extent that it shrinks away from the cell wall. The cell wall is highly porous and allows the external solution to enter through it and fill the space between the protoplasm and cell wall. Thus, the space between the protoplasm and cell wall is occupied by external solution plus water which has leached out of the protoplasm.

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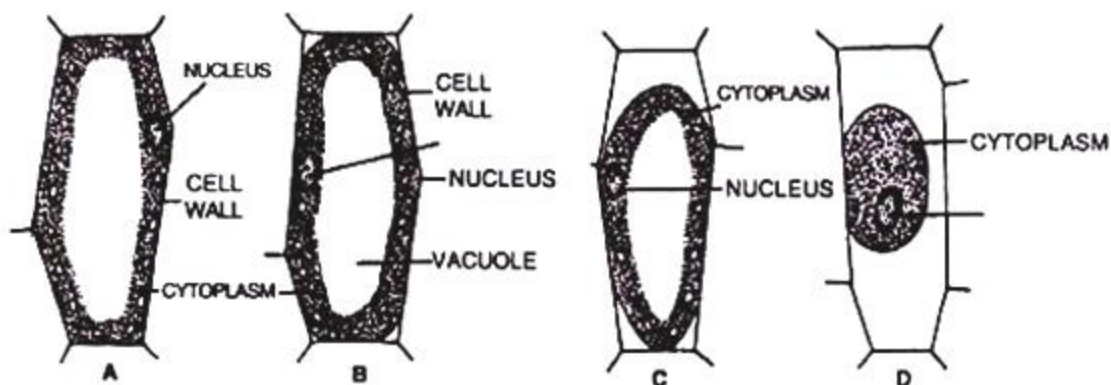


Fig. The above figures show the various stages of plasmolysis in a cell. A. Normal cell. B. C. & D are stages of plasmolysis.

Importance of Plasmolysis:

- It is a vital phenomenon as it explains the process of osmosis.
- Plasmolysis demonstrates the permeability of the cell wall and the semipermeable nature of the protoplasm.
- It helps to detect whether a particular cell is living or dead as the plasmolysis does not take place in a dead cell.
- Osmotic pressure of a cell can be determined by plasmolytic method.

Useful applications in daily life-

- It plays most vital role in the preservation of meat, jellies and other food stuffs, and thereby prevents them from being destroyed by bacteria and fungi. Salting of food stuffs (to be preserved) raises the osmotic pressure of the preservation medium. Bacteria and fungi get plasmolysed and killed due to exosmosis.
- Plasmolysis is also involved in killing of weeds in lawns, orchards and agricultural fields by chemical weedicides.
- It helps in preventing the growth of plants in the cracks of the walls. Salting of such plants induces plasmolysis, and the unwanted plants are killed.